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GAS ABSTRACTS

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2. APPLIANCES

Burners

Dudley, C. C. BURNER ADJUSTMENT — PART II. *Butane-Propane News* **10**, 82, 84-86 88, 91-92 (1948) *December.*

This phase of the discussion deals with the supply of gas; range top burner, oven burner and igniter adjustments; as well as the problems encountered in adjusting gas water heaters. Much detail is given to pointing out the cause of many common problems.

E. F. Davis

Flue Losses

SURFAC E COMBUSTION CORPORATION OFFERS NOMOGRAPHS ON FLUE LOSSES. *Gas Age* **102**, 20-21, 64 (1948) *November* 25.

Nomographs are given for direct reading of the flue losses from domestic gas furnaces by measuring the CO_2 content and the temperature of the flue gas. These graphs were published to show the small effect of flue gas temperature on the heat losses.

E. F. Davis

Milk Dryer

Kerr, R. H. SOLVING PROBLEMS IN UTILIZATION—DIRECT-FIRED MILK DRYER. *Gas* **24**, 57 (1948) *November.*

A detailed description is given of a gas fired milk dehydrator, with specifications for the temperatures required, gas input rate, dehydration rate and hourly capacity. With gas at 41 cents per Mcf the gas fuel cost is 16 cents per lb.

E. F. Davis

Glass Industry

Tomes, J. A. THE APPLICATION AND POTENTIALITIES OF TOWN GAS IN THE HAND-BLOWN DOMESTIC GLASS INDUSTRY. *Gas Times* (British) **57**, 213-215 (1948) *November* 19; *Gas World "Supplement"* (British) **129**, 112-118 (1948) *November* 20.

See *Gas Abstracts* **4**, 227 (1948) *December* for abstract.

Space Heating

Fuidge, G. H. DOMESTIC GAS SPACE HEATING—II. *Gas World* (British) **129**, 718-722 (1948) *November* 13.

See *Gas Abstracts* **4**, 228 (1948) *December* for abstract.

Johnson, L. E. HOW TO COMBINE SOLAR HEATING, RADIANT HEATING, AND THE HEAT PUMP. *Heating & Ventilating* **45**, 86-90 (1948) *December.*

Suggestions are given for properly designing an installation embodying solar heating and radiant heating by use of a heat pump. Some of the recent suggestions as to the radiant panel temperatures required are discussed.

E. F. Davis

3. COMBUSTION AND INDUSTRIAL FURNACES

Combustion

Petty, D. S., Wright, E. P. and Garner, F. H. FUNDAMENTAL WORK ON COMBUSTION IN GERMANY. *J. Inst. Petroleum* (British) **34**, 706-733 (1948) *October.*

This paper presents an abbreviated version of B.I.O.S. (British Intelligence Objectives Sub-Committee) Report No. 1612, covering the general subjects: (1) physics and chemistry of oxidation and flames; (2) combustion in spark-ignition engines, and (3) combustion in diesel engines.

A. J. Rudnitzki

Fuel Comparison

Rowley, L. N., McCabe, J. C. and Skrotzki, B.G.A. FUELS AND FIRING. *Power* **92**, 735-782 (1948) *December.*

This paper is devoted to a study of the three basic fuels; gas, oil and coal. Consideration is given to the combustion processes, physical constants and combustion calculations. A description and method of selection of equipment for burning each fuel are given.

E. F. Davis

Nitrogen Fixation

Gilbert, N. and Daniels, F. FIXATION OF ATMOSPHERIC NITROGEN IN A GAS HEATED FURNACE. *Ind. Eng. Chem.* **40**, 1719-1723 (1948) *September.*

By using magnesium oxide pebbles as a heat exchanger, nitrous oxide may be obtained through the oxidation of nitrogen at high temperatures. Due to the rapid heat transfer of these pebbles, it is possible to preheat the air to 1800°C before burning with a fuel gas to reach a temperature of 2100°C. This is immediately followed by chilling in the second bed of magnesium oxide pebble so that the exit gas temperature is dropped to about 300°C.

S. Mori

Steel Forging

Eeles, C. C. GAS APPLIED TO MODERN STEEL FORGING. *Ind. Gas* **27**, 11-13, 25-27 (1948) *December.*

The factors which must be considered before applying gas heating to forging operations are discussed. The type of heating equipment available and a comparison with the fuel competitors' equipment is also given.

E. F. Davis

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Frost, W. E. and Linnett, J. W. THE MECHANISM OF SPARK IGNITION. PART II—CARBON MONOXIDE-OXYGEN MIXTURES. p. 10. PART III—EFFECT OF ADDING ORGANIC VAPORS TO HYDROGEN-OXYGEN MIXTURES. p. 10.

Hornbeck, G. A. ADDENDUM: CONTINUOUS SPECTRA AND OH ABSORPTION IN CARBON MONOXIDE-OXYGEN EXPLOSIONS. p. 10.

4. CARBONIZATION AND GASIFICATION

Distribution

Edwards, E. M. HIGH PRESSURE GAS MAINS — SPECIFICATION, PLANNING, LAYING AND TESTING. *Gas J.* (British) 255, 677-680 (1948) *September* 29.

The specifications, planning, laying and testing of high pressure gas mains (apparently for pressures up to 50 psi) are briefly discussed. Considerable details are given on field testing of gas mains.

O. Bloomer

Gasification Plant

OPEN $500,000 COAL GASIFICATION PILOT PLANT. *Petroleum Processing* 3, 1173 (1948) *December.*

Pilot plant facilities for studying the gasification of coal to Fischer-Tropsch synthesis gas were formally opened last November at Library, Pa. Pittsburgh Consolidation Coal Company and Standard Oil Development Company, jointly cooperating in the research on synthetic natural gas and petroleum production from coal, have announced that the pilot plant cost more than $500,000 and will employ 50 people. This plant will react powdered coal or char from coal carbonization with steam and oxygen to produce a gas high in hydrogen and carbon monoxide, the reactive constituents of synthesis gas. When plans for the plant were first announced, it was stated that some 50 tons of coal would be processed daily and the yield of synthesis gas was estimated at 2,400,000 cu ft per day, about 50,000 cu ft per ton. However, company engineers are said to have stated recently that the capacity will range between 100 to 150 pounds of coal per hour or around two tons per day.

J. C. Lane

Holder Cleaning

FLAME CLEANING A GASHOLDER. *Gas World* (British) 129, 502-506 (1948) *October* 2.

The necessary points to consider in order to successfully clean old steel work are discussed, and it is concluded that only oxy-acetylene flame cleaning can meet all the requirements. The procedures used to flame clean and paint an old gasholder is described in detail. Data are given on gas consumption and man hour requirements.

O. Bloomer

Solid Fuel Analysis

Edwards, A. H. THE ANALYSIS AND TESTING OF SOLID FUEL. PART I. PROXIMATE AND ULTIMATE ANALYSIS. *Brit. Coal Utilization Research Assoc.* 12, 281-290 (1948) *August.*

Analytical and test methods for solid fuels, published in British and foreign literature since 1942, are critically but very briefly reviewed. An introduction includes comments on new books, standardization, modern techniques, classification and sampling, and 12 references. The methods are grouped to include 11 references on moisture, 8 on volatile matter, 7 on ash, 9 on carbon and hydrogen, 7 on sulfur, and 8 on oxygen (direct). Four good illustrations of British apparatus are included.

O. P. Brysch

Synthesis Gas Production

Reed, R. M. and Eriksen, A. HYDROGEN AND SYNTHESIS GAS PRODUCTION. *Petroleum Engr.* 20, 278, 280, 282, 284, 290 (1948) *October.*

See *Gas Abstracts* 4, 193 (1948) *October* for abstract.

The following article, the abstract for which appear on the page indicated, is also called to your attention:

GAS STORAGE IN WATER SAND RESERVOIR AT HASTINGS. p. 7.

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Compressors

Bryan, J. L., Jr. and Wall, J. W. TROUBLE SHOOTING—WITH OPEN-TYPE COMPRESSOR INDICATOR CARDS. *Oil Gas J.* 47, 90-91, 93 (1948) *December* 16.

The use of open and closed types of indicator cards for compressor trouble shooting is discussed with the aid of a number of diagrams.

J. D. Parent

Todd, R. W. THE ECONOMICS OF PORTABLE GAS ENGINE COMPRESSOR UNITS. *Gas* 24, 44-48 (1948) *November.*

The author presents a detailed consideration of installation costs of portable and stationary compressors ranging from 150 to 400 hp. It is pointed out that an overall saving of $90 per hp on installation costs can be realized by the use of portable compressors. Pictures are presented of three of the leading manufacturers' compressors.

W. J. Merwin

DESIGNING FOR EFFICIENCY—GAS COMPRESSOR STATIONS—PART I. *Petroleum Refiner* 27, 635-640 (1948) *December.*

Proper compressor foundations, floor areas and cooling water treatment are discussed in this installment.

J. D. Parent

Corrosion

Rogers, W. F. PRESENT DAY ASPECTS OF HIGH PRESSURE WELL EQUIPMENT CORROSION *World Oil* 128, 154, 157-158, 160-161 (1948) *October.*

A figure of $3.80 per MMcf of gas is quoted as an approximate cost of condensate well corrosion. The use of corrosion resistant tubing and wellhead equipment should be used to prevent chemical treatment. A table showing the relative service of various alloys is presented.

B. E. Hunt

Shock, D. A. and Hackerman, N. EXTRACTION OF POLAR CONTITUENTS FROM HYDROCARBON SOLUTIONS. *Ind. Eng. Chem.* 40, 2169-2172 (1948) *November.*

Effective removal of certain acidic organic substances from condensate was found possible, using silica gel as adsorbent. It is hoped that this information will aid in condensate well corrosion studies.

J. D. Parent

Waldrip, H. E. PRESENT DAY ASPECTS OF CONDENSATE WELL CORROSION. *Corrosion* 4, 611-617 (1948) *December.*

The characteristics of condensate type wells, the methods of detecting corrosion in conden-

sate wells, and the approximate cost of this corrosion are discussed. The subject of chemical treatment is discussed in some detail.

B. E. Hunt

Cycling

Arthur, M. G. ECONOMICS OF CYCLING. *Petroleum Engr.* **20**, 142, 144, 146, 149-150, 152, 154, (1948) *October.*

The most profitable method of producing a condensate reservoir is examined and it is concluded that it is dependent on a number of factors and generalization is difficult. Greatest recovery does not necessarily mean maximum profit. Calculations are supplied.

J. D. Parent

Muskat, M. THE EFFECT OF PERMEABILITY STRATIFICATION IN CYCLING OPERATIONS. *Petroleum Technol.* **11**, TP-2494 (1948) *November.*

A general theory has been developed for the effect of variation in permeability on the efficiency of the gas injection phase of cycling operations. The efficiency drops as variation in permeability increases. Mathematical analyses are provided for three types of permeability variation: exponential, linear and probability.

J. D. Parent

Robertson, W. T. and Stamper, H. N. KATY GAS CYCLING PLANT. *Am. Gas J.* **169**, 21-23 (1948) *December.*

Some details are presented for the Katy cycling plant. All phases are covered except for the breakdown of raw gasoline to the various liquid products.

J. D. Parent

Dehydration

Morris, J. I. BASIC PROBLEMS IN GAS DEHYDRATION. *World Oil* **128**, 194, 196, 198 (1948) *December.*

Methods used for dehydrating natural gas are reviewed and their effective cooling ranges are given. A list of dehydrating plants and known over-all data are given. Costs of dehydration are given as 3 to 4 cents per day per Mcf.

J. D. Parent

Drill Pipe

Thompson, A. W. and Texter, H. G. FIELD TEST ON REJECTED DRILL PIPE. *Oil Gas J.* **47**, 252 (1948) *November* 11.

The results of an actual field test to determine the effect of mill defects on drill pipe failure are tabulated. Although 21 failures occurred in 46,000 ft of drilling, none were near the mill defects but were caused by corrosion fatigue. In the author's opinion more consideration should be given to the care and use of drill pipe than to the presence of surface defects.

B. E. Hunt

Flow Measurement

Loeffler, J. E. and Dotterweich, F. H. DETERMINATION OF FLOW COEFFICIENTS FOR POSITIVE FLOW BEANS. *Oil Gas J.* **47**, 83, 87, 89 (1948) *December* 16.

Flow beans appear to be as reliable as conventional flow meters. The flow coefficients depend on diameter, length, finish and straightness as well as on the shape of the entrance. Standardization is strongly recommended.

J. D. Parent

LP Gas

Ambrose, Z. C. MORE PROPANE FOR LESS MONEY. *Petroleum Engr.* 20, 220, 222 (1948) *December.*

See *Gas Abstracts* 4, 87 (1948) *May* for abstract.

Mattocks, E. O. SAFETY REQUIREMENTS FOR LIQUEFIED PETROLEUM GAS INSTALLATION *Gas Age* 102, 45-49, 82, 84, 86, 88 (1948) *October* 28.

The physical properties of LP-gases and the limits of flammability in air are presented. Drawings are shown of the arrangement of valves and fittings on LP-gas tank cars, and of the construction of relief valves and excess flow valves. The requirements of relief valves and excess flow valves are considered. Precautions to be observed in fighting LP-gas fires are mentioned.

W. J. Merwin

Noble, F. G. MAXIMUM PROPANE RECOVERY—ITS ECONOMIC AND ENGINEERING PROBLEMS. *Oil Gas J.* 47, 95-96, 98-99 (1948) *November* 18.

Increased propane recovery is desirable but expensive. Economic considerations of importance include plant location, future field operations and increased investment and operating expenses. A study of such factors leads to evaluation of the optimum propane recovery.

J. D. Parent

Natural Gasoline

Attaway, D. CONVERT SLIGO PLANT TO HIGHER PRESSURE. *Petroleum Engr.* 20, 252, 254-255 (1948) *November.*

Equipment currently in use at the Arkansas Fuel Oil Company's natural gasoline plant is described. The plant operates at higher pressure than formerly.

J. D. Parent

Webber, C. E. NEW GASOLINE PLANT AT DELHI, LA. *Petroleum Refiner* 27, 649-653 (1948) *December.*

This plant is currently collecting daily 25,000 gal debutanized gasoline, 25,000 gal butane and 23,000 gal propane from 15 to 16 MMcf gas. The plant is designed for 60% C_3 recovery or 95% C_4 recovery. Inlet gas is at 12 inches vacuum and compressed in three stages to 550 psi. Conventional modern features may be found throughout. A flow sheet and operating data are provided.

J. D. Parent

Nitrogen Removal

Latchum, J. W. METHOD FOR REMOVING NONCOMBUSTIBLES FROM FUEL GAS. U. S. 2,448,719 (1948) *September* 7.

A process for removing nitrogen from natural gas is described in which the nitrogen is absorbed by liquid sulfur dioxide at high pressures and at near room temperatures. The nitrogen is subsequently removed from the sulfur dioxide and the sulfur dioxide recycled. Hydrogen sulfide is also removed from the natural gas.

O. Bloomer

Production

Calhoun, J. C. METHODS OF OBTAINING CONNATE WATER SATURATION. *Oil Gas J.* 47, 131 (1948) *November* 25.

Methods of obtaining connate water content of cores and of the reservoir formation in place are reviewed, and some references are given.

J. D. Parent

MacRoberts, D. T. THE PROBLEM OF GAS-WELL SPACING. *Oil Gas J.* **47**, 94, 97 (1948) *December* 16.

Well spacing is said to be a purely economic problem. A mathematical approach for calculating optimum well spacing is presented.

J. D. Parent

Myers, E. M. AUTOMATIC FIELD BOOSTER STATIONS UTILIZE LOW PRESSURE GAS. *Gas Age* **102**, 78, 130 (1948) *September* 30.

Because of the changing economic situation it may be economical to produce a field at pressures below 100 pounds. Consolidated Gas Utilites Corporation has installed two automatic field booster stations which utilize low pressure gas in the east end of the Panhandle field. These stations discharge into the main line station and are serviced by personnel from the main station. Installed cost of the stations were $117 and $124 per horsepower.

O. Bloomer

Petree, E. L. GAS LIFT AS A PRODUCTION TOOL: A COMPARISON OF GAS LIFT AND ROD PUMPING IN THE SAME FIELD. *Oil Gas J.* **47**, 124, 127, 129, 130, 133-134 (1948) *August* 26.

The evaluation of the gas lift is reviewed. The cost of gas lift and rod pumping in the same field are discussed. The conditions in which gas lift pumping should be used are outlined. The principle advantage of gas lift pumping is its low first cost. Methods used for gas lift in dual completions are discussed.

O. Bloomer

Ward, J. MECHANICAL CONTROLS FOR HIGH-PRESSURE WELLS. *World Oil* **128**, 169-170, 172 (1948) *November.*

Mechanical controls for high-pressure wells may be located below ground or above ground. Underground chokes or orifices are used to limit flow from a well and also to prevent or reduce danger of freezing in the wellhead. The choke can be spring loaded if desired. Tubing safety valves are used to plug the tubing when the flow has reached a predetermined value. Surface controls are usually conventional diaphragm type motor valves with suitable pilot controls. These can serve as safety shut-in mechanisms and as remote control devices. Diagrams of valves and pictures of installations are presented.

W. J. Merwin

Storage

GAS STORAGE IN WATER SAND RESERVOIR AT HASTINGS. *World Oil* **128**, 162, 164 (1948) *October.*

Stanolind Oil and Gas Company is now experimenting with storage of gas in water bearing sands in the Hastings field. The gas is not required for repressuring since the reservoirs are water driven. Some process and geological details are given.

J. D. Parent

Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. PART IV—NO. XXXVII IN A SERIES. *Gas Age* **102**, 29-33 (1948) *November* 11.

The problem of determining optimum pipe thickness is discussed. Illustrations are presented.

J. D. Parent

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS—PART IV—NO. XXXVIII IN A SERIES. *Gas Age* **102**, 31-35 (1948) *November* 25.

Optimum thickness decreases and optimum diameter increases as line length decreases. Composite lines of varying wall thickness offer savings but pressure-limiting devices must be employed.

J. D. Parent

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS—PART IV—NO. XXXIX IN A SERIES. *Gas Age* **102**, 38-42 (1948) *December* 9.

Advantages of the combustion gas turbine for gas compression for transmission are presented. Some cost data are furnished.

J. D. Parent

Sneddon, R. INGENIOUS GAS LINE LEAK DETECTOR PROVES EFFECTIVE. *Petroleum Engr.* **20**, 340 (1948) *October.*

A new device for detection of leaks from transmission lines is described. A blade digs 14 inches into the ground and the air is sampled continuously by means of an apparatus for detecting explosive mixtures.

J. D. Parent

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Edwards, E. M. HIGH PRESSURE GAS MAINS—SPECIFICATION, PLANNING, LAYING AND TESTING. p. 3.

Smith, A., Jr. UNDERGROUND LEAKS VERSUS CATHODIC PROTECTION. p. 15.

FLAMECLEANING A GASHOLDER. p. 3.

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Corrosion

Sheppard, L. R. PIPE-LINE CORROSION BY SOUR CRUDE OIL. *Oil Gas J.* **47**, 298-300, 303, 305 (1948) *November* 11.

This paper treats of the causes, mechanisms, and detection of corrosion which is caused by sour crude oil in pipe lines. The metal permeability of hydrogen is discussed. Mitigation of this type of corrosion by oxygen, brine, and hydrogen-sulfide elimination, as well as by metal surface pacification, is described, as well as preclusive design and operating practices.

Author's abstract

Production

Caraway, E. CALCULATION OF PUMPING UNIT ENGINE DRIVES. *Petroleum Engr.* **20**, 156 (1948) *October.*

Simple engine gear and sheave calculations are presented.

J. D. Parent

Steel Embrittlement

Hildebrand, E. L. STEEL EMBRITTLEMENT IN CAUSTIC TREATING SERVICE. *Oil Gas J.* **47**, 271, 273-274 (1948) *October* 7.

The caustic strength used in many refineries is sufficient to cause the essentially intergranular caustic embrittlement of low carbon steels. Proper stress relieving of welds and pipe bends is sufficient in most instances to eliminate caustic embrittlement cracking in wrought steel.

B. E. Hunt

TCC Unit

Carney, W. M., Noll, H. D. and Hoge, A. W. TCC UNIT CATALYTICALLY PROCESSES SOUR GAS OIL. *Petroleum Engr.* **20**, 246, 248, 250 (1948) *November.*

The authors briefly describe the 5400 B/D TCC unit at El Dorado, Arkansas. The unit has been in operation for more than a year charging high sulfur content stocks (1.7% S) without serious corrosion problems. Alloy construction was limited to the most critical locations. Tables are presented showing properties of the charging stocks, typical operating data, sulfur distribution and materials of construction used at various points of the process. It is interesting to note that only 3% of the sulfur in the feed appears in the gasoline, the balance being approximately equally distributed between the coke and gas and the cycle stock.

W. J. Merwin

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Thompson, A. W. and Texter, H. G. FIELD TEST ON REJECTED DRILL PIPE. p. 5.

7. ANALYTICAL METHODS AND TESTS

Spectroscopy

Heigl, J. J., Black, J. F. and Dudenbostel, B. F., Jr. DETERMINATION OF TOTAL OLEFINS AND TOTAL AROMATICS IN HYDROCARBON MIXTURES BY RAMAN SPECTROMETRY. *Oil Gas J.* **47**, 285 (1948) *November* **11.**

A high speed recording apparatus for Raman spectrometry is described and illustrated diagrammatically. It has been found satisfactory for the analysis of hydrocarbon mixtures for total olefin and aromatic content.

S. Katz

Sobcov, H. and Hochgesang, F. P. CONTINUOUS DETERMINATION OF CO AND CO_2 IN PILOT PLANT AND REFINERY OPERATIONS USING AN INFRARED GAS ANALYZER. *Oil Gas J.* **47**, 274, 276 (1948) *November* 11.

The design of an infrared gas analyzer which does not depend on dispersion of light is described.

S. Katz

Water Determination

Gallaway, W. S. WATER DETERMINATION IN GASEOUS PROPANE BY MEANS OF INFRARED SPECTROSCOPY. *Oil Gas J.* **47**, 279-288 (1948) *November* 11.

The detection of water vapor in propane is rapidly and accurately carried out in the region near 6 microns. An accuracy of 0.05 to 0.1 mg. of water per l. of gas is easily realized.

S. Katz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Edwards, A. H. THE ANALYSIS AND TESTING OF SOLID FUEL. PART I. PROXIMATF AND ULTIMATE ANALYSIS. p. 3.

Latchum, J. W., Jr. METHOD FOR REMOVING NONCOMBUSTIBLES FROM FUEL GAS. p. 6.

8. GENERAL AND PHYSICAL CHEMISTRY

Phase Equilibria

Griswold, J., Klecka, M. E. and West, R. V., Jr. CONJUGATE LIQUID PHASE EQUILIBRIA. *Chem. Eng. Progress* 44, 839-846 (1948) *November.*

Phase diagrams are presented for the system n butane-furfural-water in the range of 100 to 200°F.

J. D. Parent

Spark Ignition

Frost, W. E. and Linnett, J. W. THE MECHANISM OF SPARK IGNITION. PART II. CARBON MONOXIDE-OXYGEN MIXTURES. *Trans. Faraday Soc.* (British) 44, 416-421 (1948) *June.*

The spark ignition of CO-O_2 mixtures has been studied. Addition of N_2 or water vapor lowers the minimum ignition pressure. Mechanisms are proposed similar to those for H_2-O_2 spark ignition which assume ignition to be associated with a high concentration of chain-forming radicals. The inert gas N_2 impedes the diffusion of the radicals from the region of the spark. Water vapor however participates in the chain-branching mechanism.

S. Katz

Frost, W. E. and Linnett, J. W. THE MECHANISM OF SPARK IGNITION. PART III—EFFECT OF ADDING ORGANIC VAPORS TO HYDROGEN-OXYGEN MIXTURES. *Trans. Faraday Soc.* (British) 44 421-427 (1948) *June.*

It has been observed that small amounts of many organic vapors lower the minimum ignition pressures of oxygen-hydrogen mixtures, but larger amounts raise the threshold pressure. It is suggested that, at the higher pressures, the organic additives probably react preferentially with the chain-forming radicals of the combustion process.

S. Katz

Spectroscopy

Hornbeck, G. A. ADDENDUM: CONTINUOUS SPECTRA AND OH ABSORPTION IN CARBON MONOXIDE-OXYGEN EXPLOSIONS. *J. Chem. Phys.* 16, 1005 (1948) *October.*

The structural part of the carbon monoxide-oxygen flame spectrum has been identified and is shown to arise from neutral oxygen molecule transitions.

S. Katz

Roberts, R. H. and Johnsen, S. E. J. MASS SPECTRA OF SOME ORGANIC COMPOUNDS. *Anal. Chem.* 20, 1225-1231 (1948) *December.*

This paper revises and corrects the tables presented in the original paper. *(Gas Abstracts* 4, 202 (1948) *October.)* The reader's attention is drawn to the large number of errors in the earlier paper.

S. Katz

Thermal Properties

Woolley, H. W., Scott, R. B. and Brickwedde, F. G. COMPILATION OF THERMAL PROPERTIES OF HYDROGEN IN ITS VARIOUS ISOTOPIC AND ORTHO-PARA MODIFICATIONS. *J. Research Natl. Bur. Standards* 41, 379-475 (1948) *November.*

This paper gives a very complete compilation of the available thermal data for hydrogen in-

cluding the isotope deuterium and both ortho and para forms. General principles used in making the calculations are described. The data include the thermodynamic functions, S°, $H^\circ - E_0^\circ$, $(F^\circ - E_0^\circ)/T$ and C_p for the ideal gases, the dissociation constants and the equilibrium ortho-para compositions. PVT data include values of z, the compressibility factor and first and second derivatives of z with respect to temperature and density. Tables of entropy and enthalpy differences between the real and ideal gases are given over a range of pressures and temperatures. Thermal properties of the condensed phases are also given. A temperature—entropy diagram covering the experimental range (0-600°K) is included.

S. Katz

Thermodynamic Properties

Organick, E. I. and Studhalter, W. R. THERMODYNAMIC PROPERTIES OF BENZENE. *Chem. Eng. Progress* **44**, 847-854 (1948) *November.*

Thermodynamic properties of saturated benzene have been determined in the temperature range between 100°F and the critical temperature (553.1°F). The properties of superheated benzene are tabulated for temperatures up to 1800°F at various pressures between atmospheric pressure and 3000 psi. Compressibility factors are given, and the tables are supplemental with a Mollier chart.

S. Katz

Prengle, H. W., Jr., Greenhaus, L. R. and York, R., Jr. THERMODYNAMIC PROPERTIES OF n-BUTANE. *Chem. Eng. Progress* **44**, 863-868 (1948) *November.*

The thermodynamic properties of saturated butane are tabulated between 31.1°F and the critical point (305.56°F). The properties of the superheated vapor for temperatures up to 540°F and pressures to 300 atm. are also listed. A Mollier chart is included.

S. Katz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Gallaway, W. S. WATER DETERMINATION IN GASEOUS PROPANE BY MEANS OF INFRARED SPECTROSCOPY. p. 9.

Heigl, J. J., Black, J. F. and Dudenbostel, B. F., Jr. DETERMINATION OF TOTAL OLEFINS AND TOTAL AROMATICS IN HYDROCARBON MIXTURES BY RAMAN SPECTROSCOPY. p. 9.

Obert, E. F. THE COMPRESSIBILITY CHART AND THE IDEAL REDUCED VOLUME. p. 12.

Sobcov, H. and Hochgesang, F. P. CONTINUOUS DETERMINATION OF CO AND CO_2 IN PILOT PLANT AND REFINERY OPERATIONS USING AN INFRARED GAS ANALYZER. p. 9.

10. CHEMICAL ENGINEERING

Agitators

Hooker, T. PREDICTION OF POWER CONSUMPTION FOR GEOMETRICALLY DISSIMILAR AGITATORS. *Chem. Eng. Progress* **44**, 833-838 (1948) *November.*

The authors present charts which enable prediction of agitator power consumption for most installations within ±20%. The agitating system is first classified as to flow pattern—whether axial, tangential, or radial. The Reynolds number is calculated and the power function is read from a chart. This number is corrected by factors which take into account geometric dissimilarity.

W. J. Merwin

Compressibility Chart

Obert, E. F. THE COMPRESSIBILITY CHART AND THE IDEAL REDUCED VOLUME. *Ind. Eng. Chem.* **40**, 2185-2186 (1948) *November.*

Generalized compressibility charts are convenient to use when temperature and pressure are known, but are awkward to use when volume is one of the two known quantities. Su has previously defined ideal reduced volume as molar volume divided by ideal gas molar volume, and the author shows this is simply the compressibility factor multiplied by the ratio of reduced temperature to reduced pressure. Lines of constant reduced volume are added to a compressibility chart so as to enable one to solve readily for the compressibility factor when volume is one of the known quantities.

J. D. Parent

Cooling Tower

HOW TO ESTIMATE COOLING TOWER PERFORMANCE. *Heating, Piping, Air Conditioning* **20**, 76-78 (1948) *December.*

Tables and graphs are presented to assist in preliminary design estimates of the area, weight, power requirements and performance characteristics of proposed cooling towers.

H. Dirksen

Distillation

Murdoch, P. G. MULTICOMPONENT DISTILLATION. *Chem. Eng. Progress* **44**, 855-862 (1948) *November.*

Algebraic equations are presented for multicomponent distillation with the assumptions of constant relative volatility and constant molal reflux.

J. D. Parent

Scheibel, E. G. PRINCIPLES OF EXTRACTIVE DISTILLATION. *Chem. Eng. Progress* **44**, 927-931 (1948) *December.*

A method is provided for choosing a solvent for extractive distillation. Requirements for the added substance are listed. Vapor feed is shown to be advantageous in all cases.

J. D. Parent

Fluid Flow

Weske, J. R. INVESTIGATIONS OF THE FLOW IN CURVED DUCTS AT LARGE REYNOLDS NUMBERS. *J. Applied Mechanics* **15**, 344-348 (1948) *December.*

It is found that the flow in curved ducts at high Reynolds numbers may be analyzed by methods adapted from the theory of boundary layers. Integration of the equation of motion of the "shedding layer" led to relations for the net pressure drop of curved ducts as a function of radius ratio and of Reynolds number.

Author's abstract

Fluidized Solids Pilot Plants

Nicholson, E. W., Moise, J. E. and Hardy, R. L. PILOT PLANTS: FLUIDIZED SOLIDS PILOT PLANTS. *Ind. Eng. Chem.* **40**, 2033-2039 (1948) *November.*

The authors present a comprehensive discussion of fluidized solids pilot plants. The advantages and limitations of the fluidized solids technique are mentioned. The authors recommend small scale fluidization studies on the materials to be handled before proceeding with the design. The design of reaction vessels, gas and solids distributors, solids recovery systems, circulating equipment, standpipes, and strippers is discussed. Other design factors such as measurements, temperature, densities, levels, solids flow rates, heat transfer and temperature control are also covered.

W. J. Merwin

Fractionation

Tivy, V. V. ST. L. AUTOMATIC CONTROL OF FRACTIONATING TOWERS. *Oil Gas J.* 47, 85-87, 89, 124, 127 (1948) *November* 25.

The various factors which influence selection of control equipment are illustrated by examining the layout of a fractionating column, discussing the different methods of control and the reasons for selecting the various types. The author discusses extensively various methods of temperature control of columns. Temperature control elements should be located at a sensitive point in the column. Where there is not much temperature gradient through the column, a differential temperature control is used. This may act on the heat supply to the kettle, on the rate of bottoms withdrawal, or on the rate of overhead withdrawal. Sometimes instead of using temperature as a control point, a vapor pressure bulb is used to actuate various controllers.

W. J. Merwin

Wilson, G. W. FRACTIONATING COLUMN INSTRUMENTATION—PART I. *Oil Gas J.* 47, 63-64, 69, 71, 75 (1948) *December* 2.

The author classifies control systems for fractionating towers as (a) fixed system on material balance control; (b) fixed system on temperature control; (c) variable system on material balance control; and (d) variable system on temperature control. These control systems are illustrated by flow diagrams and are discussed in considerable detail.

W. J. Merwin

Wilson, G. W. FRACTIONATING COLUMN INSTRUMENTATION. PART II. *Oil Gas J.* 47, 75-76, 79, 81, 82 (1948) *December* 9.

The author presents flow diagrams and operating charts for a series of fractionating columns on cyclohexane operation and on solvents operation. Charts are also presented comparing the reaction time and accuracy of a bulb type temperature controller with a resistance thermometer type of controller. The author then describes a "spilling indicator" which is used to indicate when a tower becomes overloaded.

W. J. Merwin

Unit Processes

Garber, H. J. OTHER UNIT PROCESSES. *Ind. Eng. Chem.* 40, 1684-1691 (1948) *September.*

This is the last paper of a symposium on unit processes and it reviews the literature published since 1941 on unit processes of a miscellaneous nature, such as calcination, condensation, desulfurization, reduction, and reactions activated by electrical discharge.

W. J. Merwin

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Loeffler, J. E. and Dotterweich, F. H. DETERMINATION OF FLOW COEFFICIENTS FOR POSITIVE FLOW BEANS. p. 5.

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Flange Design

Lonngren, H. E. OBROUND MANHEAD COVER PLATES DESIGN CALCULATIONS. *Petroleum Refiner* 27, 102-103 (1948) *August.*

Obround flanges are designed by considering the round portion and the rectangular portions separately. The author presents a detailed example of calculations pertaining to an obround flange.

W. J. Merwin

Gas Thermometer

Tunnicliff, D. D. GAS THERMOMETER FOR AUTOMATIC CONTROL OF LOW TEMPERATURES. *Anal. Chem.* 20, 962-964 (1948) *October.*

A gas thermometer is described for automatic control of the temperature of a distilling tube as required in the separation of gases by isothermal distillation. The distilling tube is surrounded by a copper block which also acts as the helium filled reservoir of the thermometer. A constant heat loss from the distilling tube to liquid air surrounding the copper block is offset by intermittent heating which is controlled by the position of the mercury meniscus in a manometer connected to the helium reservoir. The thermometer may be set to control at any desired point down to 180°C ±3°C.

O. Bloomer

Tank Construction

Coe, E. H. THESE SHORT-CUTS WILL SPEED YOUR DESIGN AND ESTIMATION OF TANKS. *Chem. Eng.* 55, 107-109 (1948) *September.*

The author presents six charts which permit design and cost estimation of tanks up to 1000 gallons capacity.

W. J. Merwin

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Hooker, T. PREDICTION OF POWER CONSUMPTION FOR GEOMETRICALLY DISSIMILAR AGITATORS. p. 11.

Tivy, V. V. St. L. AUTOMATIC CONTROL OF FRACTIOING TOWERS. p. 13.

Ward, J. MECHANICAL CONTROLS FOR HIGH-PRESSURE WELLS. p. 7.

Wilson, G. W. FRACTIONATING COLUMN INSTRUMENTATION. PART I. p. 13. PART II. p. 13.

HOW TO ESTIMATE COOLING TOWER PERFORMANCE. p. 12.

12. MATERIALS OF CONSTRUCTION

Corrosion

Friend, W. Z. CORROSION BY SULFATES. *Chem. Eng.* 55, 145-147 (1948) *November.*

The results of corrosion tests of various metals exposed to the liquors and slurrys involved in the productions of sulfates are tabulated and discussed. The various sulfates discussed are ammonium sulfate, aluminum sulfate, non oxidizing sulfates, and oxidizing acid sulfates.

B. E. Hunt

Lang, W. H. WHAT CAUSES CORROSION OF METALS? *Heating & Ventilating* 45, 64-66 (1948) *November.*

A discussion of the various theories of corrosion, acid theory, biological theory, peroxide theory, and electrochemical theory, which have been advanced is given. Of these theories, the electrochemical theory has proved the most useful. The basic factors affecting corrosion and the relative importance of these factors in alkaline, neutral, and acid solutions are discussed.

B. E. Hunt

Smith, A., Jr. UNDERGROUND LEAKS VERSUS CATHODIC PROTECTION. *Chem. Eng.* 55, 139-141 (1948) *November.*

The results of cathodic protection resulting from the installation of magnesium anodes at the site of leak repairs in the buried piping system of a large chemicals company are discussed. A new program of cathodic protection testing to be instigated in the near future by this company is considered.

B. E. Hunt

MANAGEMENT INFORMATION ON CATHODIC PROTECTION. *Petroleum Engr.* 20, 262-263 (1948) *December.*

See *Gas Abstracts* 4, 206 (1948) *October* for abstract.

Corrosion Resistant Materials

Nee, J. W. FORMULATION OF CORROSION RESISTANT PAINT. *Corrosion* 4, 599-610 (1948) *December.*

A discussion is presented concerning the resinous bases and pigments from which corrosion resistant paints are formulated. Some of the applications of the various formulations are discussed.

B. E. Hunt

DIRECTORY OF MATERIALS. *Chem. Eng.* 55, 116-128 (1948) *November.*

A table is presented of corrosion-resistant materials of construction. The classes of materials are: metals and alloys, carbonaceous products, cements, ceramics, rubber products and plastics. The manufacturer is listed, the material is described and the most important application is mentioned.

W. J. Merwin

Jet Pumps

Richelson, M. CONSTRUCTION MATERIALS FOR JET PUMPS. *Chem. Eng.* 55, 114-117, 248, 250, 252 (1948) *September.*

Materials of construction for jet pumps in corrosive service are limited chiefly to six nonmetallic and eight metallic substances. The nonmetallics are hard rubber, Haveg, Karbate, porcelain, pyrex and stoneware. The metallics are bronzes, chrome plated cast iron, duriron, Hastelloys, antimonial lead, monel, stainless 304, stainless 316. A table is presented comparing the materials as to resistance to heat, thermal shock, erosion, machinability, etc. The materials are also rated as to their ability to withstand certain corrosives.

W. J. Merwin

Refractories

Whittemore, O. J., Jr. PURE OXIDE REFRACTORIES WITHSTAND HIGH TEMPERATURES. *Materials & Methods* 28, 79-81 (1948) *December.*

Porosity, shrinkage, thermal conductivities, and other properties that are specific to various high temperature, pure oxide refractories are evaluated. The pure oxides are free from impurities that have a fluxing effect and are bonded together in a pure form as opposed to the low temperature glass bonded type of refractory. The pure oxide refractories are divided as to whether it is a light refractory (crucibles, tubes) or heavy refractory (bricks).

S. Mori

The following articles, abstracts for which appear on the pages indicated, are also called to your attention:

Hildebrand, E. L. STEEL EMBRITTLEMENT IN CAUSTIC TREATING SERVICE. p. 8.

Rogers, W. F. PRESENT DAY ASPECTS OF HIGH PRESSURE WELL EQUIPMENT CORROSION. p. 4.

Sheppard, L. R. PIPE-LINE CORROSION BY SOUR CRUDE OIL. p. 8.

Waldrip, H. E. PRESENT DAY ASPECTS OF CONDENSATE WELL CORROSION. p. 4.

The following bulletins of the Institute of Gas Technology Research Bulletin Series are called to your attention. A limited number of copies of these bulletins are available for free distribution of Associate Members of the Institute of Gas Technology, while others may obtain them for the price indicated. Address the Director, Institute of Gas Technology, Technology Center, Chicago 16, Illinois.

No. 1 Storage of Natural Gas as Hydrate, by Joseph D. Parent. 1948. $2.50.

No. 2 Equilibrium Compositions and Enthalpy Changes for Reactions of Carbon, Oxygen and Steam, by Joseph D. Parent and Sidney Katz. 1948. $10.00.

No. 3 Supplying Household Heating Services by High Temperature Circulating Liquids and Vapors, by Edward F. Davis, Joseph J. First and Ralph E. Peck. 1948. $2.50.

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